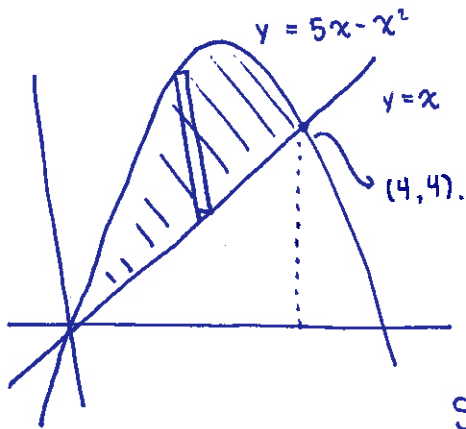



# Daily Homework # 20.

5.1 # 1, 3, 13, 14, 26, 47.

1.



$\int_0^4 5x - x^2 dx$  is the area 

$\int_0^4 x dx$  is the area 

So that

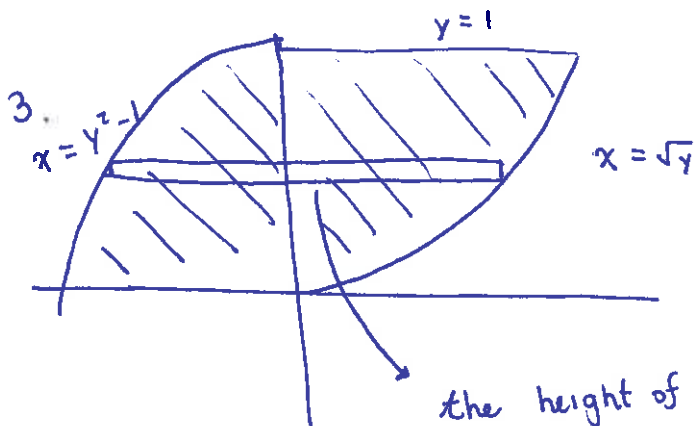
$$\int_0^4 5x - x^2 dx - \int_0^4 x dx$$

$$= \int_0^4 5x - x^2 - x dx$$

} the area of region.

$$= 2x^2 - \frac{1}{3}x^3 \Big|_0^4 = 2(16) - \frac{1}{3}(64)$$

$$= \boxed{\frac{32}{3}}$$



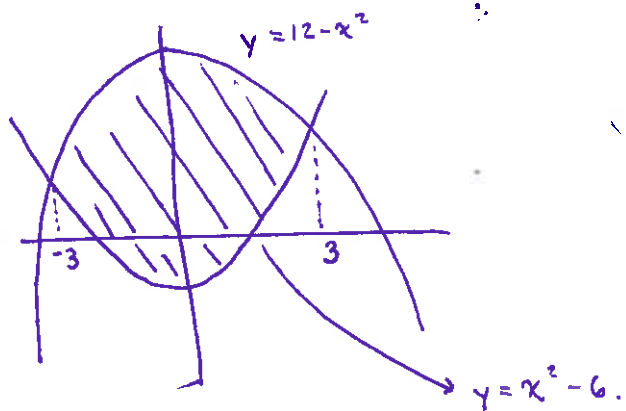
The area on the right is:

$$\int_0^1 \sqrt{y} dy.$$

The area on the left is:  $-\int_0^1 y^2 - 1 dy.$

$$\text{So that } \int_0^1 \sqrt{y} - (y^2 - 1) dy = \frac{2}{3} y^{3/2} - \frac{1}{3} y^3 + y \Big|_0^1 = \frac{2}{3} - \frac{1}{3} + 1 = \frac{4}{3}$$

13.

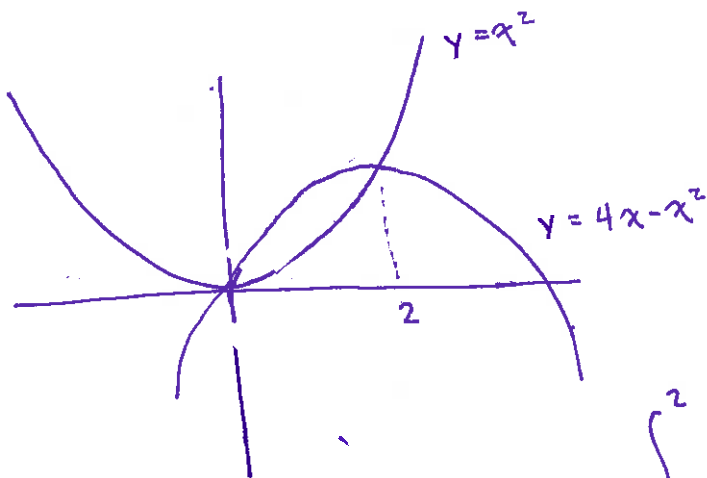


Where do  $y = 12 - x^2$  and  $y = x^2 - 6$  intersect?

$$\begin{aligned} 12 - x^2 &= x^2 - 6 \\ 18 &= 2x^2 \Rightarrow 9 = x^2 \\ \Rightarrow x &= \pm 3 \end{aligned}$$

$$\begin{aligned} \int_{-3}^3 (12 - x^2) - (x^2 - 6) dx &= \int_{-3}^3 18 - 2x^2 dx \\ &= 2 \left( 9x - \frac{1}{3} x^3 \Big|_{-3}^3 \right) = 2(27 - 9 - (-27 + 9)) = 2(36) = 72. \end{aligned}$$

14.

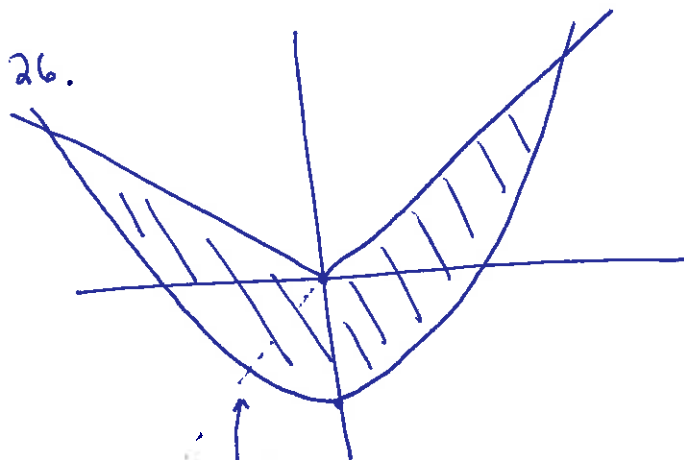


Where do  $y = x^2$  and  $y = 4x - x^2$  intersect?

$$\begin{aligned} x^2 &= 4x - x^2 \\ 2x^2 &= 4x \Rightarrow x = 0, 2 \end{aligned}$$

$$\begin{aligned} \int_0^2 (4x - x^2) - x^2 dx &= \int_0^2 4x - 2x^2 dx \\ &= 2x^2 - \frac{2}{3} x^3 \Big|_0^2 = 8 - \frac{16}{3} = \frac{8}{3} \end{aligned}$$

26.



That's  
the  $x = -1$   
soln that  
doesn't make  
sense.

When does  $y = |x|$  intersect  
 $y = x^2 - 2$ .

$$y = x \text{ and } y = x^2 - 2$$

$$\Rightarrow x = x^2 - 2$$

$$0 = x^2 - x - 2$$

$$0 = (x - 2)(x + 1)$$

sols  $x = -1, 2$   
↑  
nope b/c

Notice, the region is symmetrical! Let's take the right half.

$$\int_0^2 x - (x^2 - 2) dx = \left. \frac{1}{2}x^2 - \frac{1}{3}x^3 + 2x \right|_0^2$$

$$= 2 - \frac{8}{3} + 4 = \frac{10}{3} \quad \left. \vphantom{\int_0^2} \right\} \text{area of right half}$$

$\Rightarrow$  of entire region  $\boxed{\frac{20}{3}}$

47. a) After 1 minute, car A is ahead.  $\int_0^1 v_1(t) dt = \text{distance traveled by A.}$   
is bigger than  $\int_0^1 v_2(t) dt$ .

b) the area of the shaded region is the distance between the cars after 1 minute.

c) I think maybe car A is ahead, but not by much... we must compare the areas between the curves.

d) B.O.B. says 2.2 min. Anything somewhat close seems okay.

